function of N. Numerous precautions were necessary as in the earlier investigation.

The results of the observations on four rotors are given in Table I. The "set" of observations there referred to contained four readings, or two double deflections.

With nickel and cobalt observations were made at more than one speed; and H/N was found to be independent of the speed, within the limits of the experimental error, as in the earlier experiments with iron. It is also seen to be independent of the size and shape of the body in rotation, which is an implicit requirement of the theory developed above.

TABLE I

Intrinsic Magnetic Intensity of Rotation in Iron, Nickel and Cobalt

Rotor	Series	Groups	Mean Speed R.P.S.	Number of Sets	$-\frac{H}{N} \times 10^7$ E.M.U. Mean	Average Departure from Mean (Sets)
Steel (smaller)	1	1–2	44.8	21	5.1	0.5
Steel (larger)	2	3–4	47.8	21	5.2	1.2
Cobalt...	3	5–7	20.2	17	4.8	2.2
	4	8–11	30.3	23	5.6	1.2
	5	12–25	45.5	79	6.0	0.9
	6	22	45.0	7	6.5	0.3
	7	24	44.8	9	5.9	0.4
	8	25	44.8	5	6.1	0.4
Nickel...	9	26	20.5	4	4.7	2.0
	10	27–28	30.5	9	6.7	1.1
	11	29–32	45.3	37	6.1	0.5

The value of H/N is in all cases negative, but less in magnitude than that of the standard value of $4\pi m/e = -7.1$ e.m.u. for negative electrons in slow motion, as was the case in the earlier experiments with iron, which gave 3.6 and 3.1 in place of 7.1. In view of the experimental errors, it still seems to me doubtful whether these discrepancies indicate definitely that in addition to the negative electrons in orbital revolution there are also positive electrons revolving in orbits. The probability of the presence of the latter orbits is great from the known expulsion of α particles with great velocities from radio-active substances. There can be no question, however, that the effect of the negative electrons is at least greatly preponderant.

A few preliminary results, not of a precise character, but consistent with those of Table I., have been obtained with a rotor of very soft iron and with a rotor of Heusler alloy—a magnetic compound of aluminum, copper and manganese in atomic proportions.

In summing up the chief results of the two investigations it may be said that, in addition to revealing a second and entirely new method of producing magnetization in magnetic substances, they have proved in a direct and conclusive way, on the basis of classical dynamics alone and without dependence on the still obscure theory of radiation, (1) that Ampèreian currents, or molecular currents of electricity in orbital revolution, exist in iron, nickel, cobalt and Heusler alloy; (2) that all or most of the electricity in orbital revolution is negative, or at least that the effect of the negative electricity is preponderant; and (3) that this electricity has mass or inertia. Furthermore, if we admit the classical theory of radiation, according to which a ring of electrons moving in a circular orbit must continually emit energy, but at a smaller rate the more uniformly the electricity is distributed in the ring, we must conclude that the electrons are closely packed in the Ampèreian orbits. For the existence of residual or permanent magnetization proves that these orbits are essentially permanent and can not therefore emit energy at an appreciable rate.

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THE ORIGIN OF THE PINK BOLLWORM

THE determination of the original habitat of the pink bollworm (*Pectinophora gossypiella* Saunders) is of great interest in relation to the present distribution of this insect and may be of importance later as indicating where parasitic or other natural checks may be found. A scrutiny of the records gives strong support to the theory that this insect originated in Southern Asia, probably India.

The first account of the insect by W. W.

Saunders[1] in 1842 accompanying its original description is based on specimens received from India, and the only information now available in relation to these specimens is an extract quoted by Saunders from a letter from a certain Dr. Barn, superintendent of the Government Cotton Plantations at Broach (Baruch) in western India. This extract is short and significant and is here given in full:

> The inclosed is an insect which was very destructive to the American cotton which was sown here (Broach), on light alluvial soil. The egg is deposited in the germen at the time of flowering, and the larva feeds upon the cotton seed until the pod is about to burst, a little previous to which time it has opened a round hole in the side of the pod for air, and at which to make an exit at its own convenience, dropping on the ground, which it penetrates about an inch, and winds a thin web in which it remains during the aurelia state. Curiously enough, the cotton on the black soil was not touched by it. The native cotton is sometimes affected by it.

This letter was addressed to a certain Dr. Royle who forwarded the specimens with this quotation from Dr. Barn to Mr. W. W. Saunders. In relation to this quotation, Mr. Saunders makes this significant comment:

> It is interesting to remark that the cotton grown from American seed is attacked in preference to any other and that the cotton plant when grown upon black soil remains free from injury. The former fact could be accounted for by the American cotton being of a different species to that usually grown in India and probably offers seeds which are more suitable to development of the larvæ.

The reason for the greater susceptibility of and damage to the American cotton is undoubtedly that suggested by Mr. Saunders and is supported by many similar experiences with introduced plants or introduced plant pests. The hardy and rather unproductive cottons of India and other southern Asiatic countries probably long associated with this insect evidently were then and are still fairly resistant to its attacks, and, on the other hand, the introduced American and Egyptian varieties are less resistant and perhaps furnish exceptional breeding conditions and were, therefore, when introduced into India and elsewhere in southern Asia, much more seriously attacked. This condition at once brought into prominence an insect which previously had been for the most part overlooked. It is significant that Dr. Barn should note that "native cotton is sometimes affected by it," indicating that it was a known but comparatively unimportant enemy of such cotton in India prior to 1842.

Saunders, in his article, makes no suggestion that the insect is other than a native Indian species, or, as has been stated by some writers, that it was imported with the American cotton. Responsibility for the theory of possible American at least African origin seems to rest with J. H. Durrant. This author, reviewing (1912)[2] the specimens of *Gelechia gossypiella* in the British Museum, summarizes the earlier Indian records with an evident strong mental bias toward an *inferred* American or Egyptian origin. An examination of these records indicates that there is no real warrant for this bias. Of the Indian record of 1842, quoted above, from Saunders, he suggests the importation of the insect with American cotton simply because of the excessive damage to this introduced variety in comparison with native cottons, ignoring the perfectly reasonable explanation of this condition advanced by Saunders. The records for Cawnpore (1883) and Lahore (1893–94) report damage to "cotton" but this "cotton" is *inferred* by Durrant to be Egyptian because from other sources he learned that some Egyptian cotton was being experimentally grown at or near these places and, similarly, another record from Surat, about which no information was available, is *assumed* by Durrant to have a similar history.

August Busck (1917),[3] following Durrant, without critical examination of the latter's data, accepts his general conclusions, and expresses the belief from this "evidence," and

[1] Saunders, W. W., *Trans. Ent. Soc. London,* Vol. III., pp. 284–85, 1843.

[2] Durrant, J. H., *Bul. Ent. Research,* Vol. III., Pt. 2, pp. 203–06, Fig. 1, London, 1912.

[3] Busck, August, *Jour. Agric. Research,* U. S. D. A., Washington, Vol. IX., pp. 343–70, 6 pls., 1917.

certain insect relationships which will be noted below, that Africa is indicated as the original home of the ping bollworm.

The support of this theory of African origin based on the fact that the only near relative of the pink bollworm, *P. malvella* Zeller, is known from Africa as well as Southern Europe should be given very little weight, inasmuch as a more accurate knowledge of the distribution of this related insect may show it to range, as it probably does, throughout southern Asia in addition to its now known range in Africa and southern Europe. In fact, it would be most astonishing that an insect having a range already as wide as that indicated, should not occur also in contiguous Asia, and, furthermore, entomological collections and explorations in Asia have not been made with any such thoroughness as to give this argument any substantial support.

On the other hand, Fletcher (1917),[4] reviewing the pink bollworm situated in India, states that "*Gelechia gossypiella* occurs throughout the plains of India, Burma and Ceylon, as a pest of cotton, serious in most localities, especially in the United Provinces, Punjab, and the Northwest Frontier Provinces. In all districts exotic varieties seem to be most subject to attack." He further notes that "*Gelechia gossypiella* was first described from India in 1842, and is probably endemic in India. It has since been introduced into other cotton-growing areas and has proven a serious pest, apparently worse than it is in India as a whole."

In this connection it is interesting to note that the record, as reported by Durrant,[2] indicates a wide distribution of the insect throughout southern Asia, including India, Ceylon Berma, Straits Settlements, Philippines, Japan (?) and Hawaii—records, most of them, antedating from eight to seventy years, the first report of the insect in Egypt.

Looking at the question, also, from the standpoint of cotton culture in Egypt, if it is true, as has been so strongly urged,that this insect is of African origin, and reached India from Egypt, it must follow that during the last seventy-five or one hundred years, it has had ample opportunity to demonstrate in Egypt, throughout the whole period, its maximum destructiveness. The record of the cotton crop in Egypt up to and subsequent to the first recognition of the pink bollworm in 1911 certainly gives no support to the theory of Egyptian origin; on the other hand, the evidence of its recent entry into Egypt as given by Ballou[5] and others is circumstantial and practically determined, both as to time and place of introduction. Briefly, there were large importations of imperfectly ginned or of seed cotton from India in the years 1906 and 1907. Much of this cotton was distributed to towns near Alexandria for ginning. The discovery of the pink bollworm in the Delta region in Egypt was in the lower Delta, in the vicinity of towns where this seed cotton went for ginning. It was first noted in 1911 at Foueh, and in the following year at four other points, three of which were very close to Foueh. The first substantial general field injury observed from this insect was in 1912 near Alexandria. By the end of that year, 1912, however, the insect was found pretty well throughout the Delta and also north of Cairo to a distance of a hundred miles or more, but in no case except the one field referred to was it abundant enough to do any material injury. The increase of the damage in Egypt by this insect from that period has been steady in spite of the enforcement of the most strenuous field and other control operations.

The possibility of the importation of this insect from India with a large quantity of cotton seed imported into Egypt in 1906–7 is perfectly patent in view of the known occurrence of this insect in India for three quarters of a century.

From the evidence, herein reviewed, it would seem to be well established that the native home of the insect included India and perhaps other countries of southern Asia. If its natural range extended to Africa it must

[4] Fletcher, T. Bainbrigge, Rep. Proc. Sec. Ent. Meeting. Pusa., February, 1917, pp. 10, 111–14, 1917.

[5] Ballou, H. A., *Jour. Econ. Ent.*, Vol. XI., pp. 236–45, 1918.

have been limited to equatorial Africa and certainly it had not reached prior to 1906 or 1907 the cultivated district of the Nile Valley where cotton has been a commercial crop of importance for at least a hundred years. This point of view is now held by the experts who have studied this insect in Africa and India such as Willcocks, Fletcher and Ballou.

C. L. Marlatt

HARRY KIRKE WOLFE

Professor Harry Kirke Wolfe, head of the department of philosophy in the University of Nebraska, died suddenly on July 30 last at Wheatland, Wyoming, whither he had gone for a brief outing. Dr. Wolfe was born in Illinois, in 1858, but he was a Nebraskan by rearing and he received his collegiate education in the state university. In 1883 he went to Berlin to carry further the study of the classics, which was then his interest, but while in Germany he was won to psychology, and changing to Leipzig became one of the group of young Americans who had been attracted by the fame of Wilhelm Wundt, and who were to revolutionize the teaching of the science upon their return to America. Dr. Wolfe was in the vanguard of this movement. He received his doctorate in 1886, and in 1889 he was made professor of philosophy in his alma mater, where previously this field had been the prerogative of the college head. Immediately he began to build up the physiological and psychophysical foundations of his subject, creating the first laboratories in psychology open to undergraduates in the country—a feature of the instruction which to the end was distinctive of his work. From 1889 to 1897 Dr. Wolfe's work was attended with a truly phenomenal success, not only in the immediate strength of his department but also in its influence, for he started not a few young men toward the advanced cultivation of his science—among them Professors Pillsbury of Michigan and Bentley of Illinois—as well as of the broader field of philosophy. It was in this period, too, that he published a number of monographic articles in psychophysics (out of a great series planned), and he was connected with the appearance of the *American Journal of Psychology*. Unhappily the career thus splendidly begun was interrupted by one of those accesses of bigotry which sometimes seize college authorities; and under absurd political and religious charges he was asked to resign in 1897. In the period from 1897 until 1905 Dr. Wolfe was engaged in public school work, with the result that his interest in secondary education became the predominant one for the remainder of his life. In 1905 he was called to the University of Montana, and two years later back to the University of Nebraska, where again he became head of the department which years before he had founded. This position he held until his death. In this latter period, while his old interest in experimental psychology was as keen as ever, it had constantly the bias of the secondary school needs in mind, and his laboratories became the training grounds for scores of young men and women who were to enter the public school field. Certainly there are few, if any, teachers in the middle west who have so profoundly and beneficially influenced the later development of its secondary education.

Such in brief is the outward career of a man whom all who knew him knew to be possessed of a genius for teaching. There are few qualities which the teacher should possess which he did not own in exalted measure: keenness and kindness, unfailing humor and patience and generosity of soul, and the power to inspire, all these were his; and he was loved by those under his influence as few men are loved. It is an irony—perhaps attaching to his quiet yet steadfast personality, for he was above all a man of principle—that such a man should twice in his career have come under the charges of malicious ignorance. The first occasion was in 1897. Ten years later, when he was returned to his old position his vindication came (as it was bound to come), though meantime the character of his life work had been once for all altered. The second occasion was in June of 1918, when through idle gossip his name was dragged before the inquest into loyalty forced upon the university by the State Council of Defense. He was, of